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CERN experience: Vacuum design, interventions and operation in radioactive environment

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CERN has a long experience in the conception, construction and exploitation of particle accelerators for high-energy physics. CERN accelerator complex consists of several installations facing different challenges concerning radiation activation, damage, contamination, etc. determined by the energy and type of beam: protons, heavy ions, radioactive ion beams, neutrons, etc.
This contribution will give a historical overview of different vacuum activities carried out at CERN related to material validation, design to reduce personnel exposure, tooling, telemanipulation, vacuum interventions in highly radioactive areas and management of radioactive exhaust gases. Present developments face future challenges related to upgrades and new facilities like HL-LHC, FCC and MEDICIS that require a higher degree of remote manipulation and limited access to certain parts of the machine.

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